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#### ABSTRACT

An apparatus scans an electron beam across an optical phase shift mask and automatically inspects the mask to determine the features of the phase shift mask and classification of defects. An electron beam is directed at the surface of a mask for scanning that mask and detectors are provided to measure the secondary and backscattered charged particles from the surface of the mask. The mask is mounted on an x - y stage to provide it with at least one degree of freedom while the mask is being scanned by the electron beam. By analysis of various waveform features in each of the secondary and backscatter electron waveforms obtained from a phase shift mask, various physical features of the mask can be detected, as well as their size and position determined. The thickness of chromium layers can also be determined. In the inspection configuration, there is also a comparison technique for comparing the pattern on the substrate with a second pattern for error detection.